

The Relationship Between Game Rules And Team Cohesion: An Empirical Study

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ABSTRACT

Multiplayer games (both face-to-face and online) frequently feature teams. This study investigates whether it is possible to use the rules of a game to alter the team cohesion. Game rules from two face-to-face games were analyzed using Social Identity Theory to predict which will lead to more cohesive teams. Significant differences in team cohesion ratings given by the players after the games suggest that the game rules may indeed affect the team cohesion as predicted.

Author Keywords

Game design; Teamwork; Social interaction

ACM Classification Keywords

H.5.3 Group and Organization Interfaces: Theory and models

INTRODUCTION

Since 1999, there has been an explosive growth in online multiplayer gaming [8]. However, there has been little consideration of the ways in which one might design so as to positively promote teamwork and cooperation. Instead, it would appear that teamwork and cooperation are “enforced” by making the games either too difficult or physically impossible to complete alone [7]. This does not necessarily lead to strong, cohesive and long lasting teams; in World of Warcraft, the longevity of many guilds has been shown to be less than a month [3]. Rather than *requiring* teamwork, the research discussed in this paper considers whether it is possible to *promote* teamwork and cooperation through the rules of a game and, as such, to increase the cohesion of the groups or teams that form within the game. If this were the case, game designers could have much more control over the strength of the teams that form in their games.

An online, multiplayer game called “African Farmer” is being designed as a learning tool for students of

international development and future policy makers. The game has been designed so as to give players first-hand experience of the complex decision making processes involved in small scale farming in inhospitable environments. The game also aims to encourage debate on the effects of large-scale policy decisions on individuals, their families, and their general well being. This game will be run by a game manager and played by 15-35 players. The players will form small teams of up to 3, with each team responsible for a farming household consisting of themselves and a growing number of non-playing characters (NPCs). The NPCs range from babies to adults and, if insufficiently cared for, they may get sick or even die. Over a series of annual cycles the players make decisions about what to plant, grow, buy and sell to sustain their households through a variety of hazards, such as drought or pest attack.

Although the farming element is important, player interactions are also a key learning opportunity [10]. Both inter- and intra-household interactions can have a large impact on the strategies chosen and therefore the success (or otherwise) of the players.

African Farmer is loosely based on two pre-existing face-to-face games:

1. The Green Revolution Game (GRG) [1] provides a simple yet sophisticated model of rice farming in Bihar, India. The game allows players to choose between planting normal or high yield rice to sustain their household members.
2. Africulture [2] provides a model of gender roles in an African rural community. The players have a greater range of crops to choose from, but the farming model is less sophisticated.

These games have very different social models, differing in terms of the point at which teams form, the permeability of the team boundaries, and the types of goals that players will have (see Table 1). Social Identity Theory (SIT) considers the way that group membership affects personal identity, and how different factors affect the strength of group identification. The social psychologist Henri Tajfel initially developed SIT in the 1970s as a result of his interest in prejudice, discrimination and inter-group conflict [6]. Social identity is defined as the individual’s awareness of

belonging to particular groups, and the value of those group memberships to that person. Each individual has many different group memberships, e.g. female, researcher, knitter, European, etc. At any given moment these will vary in significance and importance, based on the situation and the accessibility of the identity. If the person frequently identifies as a researcher (for example) it will be easier for them to do so in a wide range of situations, whereas quite specific circumstances may be required to make them identify as something else. Experimental research suggests that only one identity is salient at any given moment, and this allows the individual to judge how to behave, their social standing and so on [9]. GRG rates players as a team rather than individually as Africulture does, which will make the team identity more salient than the players' identities as individuals. This should increase the team cohesion in players of GRG [11].

In general it is assumed that people want to associate themselves with positive social identities whenever possible, so where it is feasible to choose a social group, people will be happier to associate with successful groups rather than unsuccessful ones. In games this would imply that better performing teams would generate more commitment. However, it is not always possible to change which group one belongs to; in GRG players are not allowed to change teams once the game has begun, unlike Africulture. The inability to change groups reduces the impact of a low-status group on team identification [4], suggesting that GRG players should, on average have a stronger group cohesion level.

The group formation stage also has an effect on the commitment of the individual to the group. If group members are allowed to select their own groups (versus being externally allocated) the commitment to the group increases. However, the work done by Ellemers et al [5] suggests that this only has an effect when the performance of the group is poor (e.g. people feel strongly committed to a group if they selected the group or if the group does well). In Africulture the team formation happens as part of the first stage of the game, after the players have discovered the roles (male or female) they will be playing and the assets they have been allocated as an individual. In GRG the team formation happens before the assets have been allocated to the team, and with less knowledge of the consequences of the team formation. There is an element of self-selection in both cases, but in Africulture the team selection is better informed which may increase the players commitment to the team. However, as this only affects the teams that perform badly this will be counter-balanced by the effect (explained above) of being unable to change teams in GRG.

These factors are summarized in Table 1. Based on the combination of the three factors above, it is predicted that players of GRG will experience a higher level of team cohesion than those playing Africulture.

GRG	Africulture
Teams form before resource allocation.	Teams form during first round after resource allocation.
Teams fixed for game duration	Team members may leave and join a different team.
Players have team goals	Players have individual goals

Table 1: Differences in the social model

METHOD

The research investigates the relationship between game rules and team cohesion in both GRG and Africulture, looking specifically at the differences in team cohesion that might exist as a result of their differing rules. This study used a between-subjects design. In order to measure the team cohesion in each game an instrument was constructed consisting of 10 items, based on a pre-existing in-group identification scale [c.f. 4]. This included statements such as "I would like to play another game with this team." and "I had a lot in common with the other team members.". Players were asked to rate how strongly they agreed with these statements on a 7-point Likert scale ranging from "Strongly disagree" to "Strongly agree".

In addition to the team cohesion measures, the questionnaire also comprised two further questions: one querying players' preferences for working in groups versus working individually, and a second question gauging the number of other players who were known to the individual before the session commenced. For the first question, players had the option of choosing between "Yes, I work best in groups", "It depends on the work and the group" and "No, I much prefer working alone". The second question used a five-point Likert scale ranging "I knew everyone" to "I knew no one".

The participants in both games were students of International Development and form part of the target audience for these games. Prior to the start of the game the participants were given an information sheet that provided details of the study, and explained that if players decided to take part in the study, they would be asked to complete a questionnaire at the end of the game. The information sheet also made it clear that player would be able to take part in the game without participating in the study. Both games were played to the rules contained in the respective manager's handbook. The games were each played for 3 hours. A paper questionnaire was then distributed to the players, who completed and returned it while the game managers prepared for a post-game discussion that allowed the players to reflect on the events of the game. This discussion is a standard part of the game experience with these games, and not specifically part of the study.

GRG was offered as an extra-curricular event as part of a summer school. 16 players signed up (10 female, 6 male). The players were asked to sit at any of the pre-arranged tables before the initial family and farm sizes had been allocated. They completed 5 annual cycles of 4 seasons, where each annual cycle allowed for the full growth cycle of a crop from sowing through to harvesting.

20 students from the School of International Development at a university in the South of England played Africulture (14 female, 6 male). This was an optional activity with no direct benefits to their grades. The players were again asked to sit at any of the pre-arranged places, with those playing “men” kept separate from those playing “women” (note that gender roles in the game bore no relation to real-life gender). The resources were allocated at this stage, followed by a period of negotiation where players formed teams. They completed 3 annual cycles of 4 seasons per cycle.

RESULTS

The 10 items of the team cohesion instrument were combined to produce a single rating for team cohesion for each player. This has a maximum value of 70.

Table 2 shows the median and range for each game: the median score for GRG was 61, while for Africulture, it was 58. The spread of scores was narrower for GRG (14 points) than for Africulture (19 points).

Game played	Median	Minimum	Maximum
GRG	61.00	56.00	70.00
Africulture	58.00	48.00	67.00

Table 2: Team cohesion scores as a function of game played

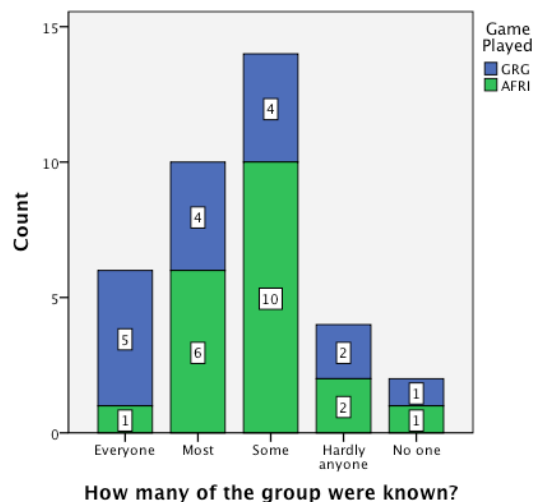


Figure 1: Frequency distribution of the number of group members each player felt they knew before playing.

A one-tailed Mann-Whitney test was conducted on these data. This revealed that the rating of team cohesion recorded by the GRG players was significantly higher than those who played Africulture ($U=99.5$, $p<.05$, $r=.31$).

In response to the question on group versus individual working preference, most ($N=21$) said it depended on the work, but a number ($N=15$) said they always prefer working in groups. No one said they always prefer to work alone. Using a Kruskal-Wallis test the team cohesion rating was not found to be significantly affected by the player’s reported liking for group work ($H(1)=0.084$, ns).

Figure 1 displays the results of how many people each player knew prior to the game session. A Kruskal-Wallis test showed that the number of players known did not significantly affect the team cohesion rating ($H(4)=7.908$, ns).

DISCUSSION

The results of the study suggest that there is a relationship between the team cohesion experienced by a team member and the particular rules of the game played, as predicted by SIT. Players of GRG reported a higher level of team cohesion than players of Africulture. The team cohesion rating was not found to correlate with the number of players known before playing, or with the player’s preference for working in groups or individually.

This finding suggests that it may well be possible to use SIT to create game rules that will affect the way that players interact in a game situation.

Although these results are encouraging, they should nonetheless be treated with some caution. For a start, although the two games used in this study are similar, and are often used in similar teaching contexts to convey the same core content, they are not identical. It was felt that using two existing and proven games was less problematic than modifying an existing game as, firstly, the effort and costs involved in producing a modified version of a commercial game would have been overly onerous and secondly, changing the rules of the existing game may have caused unanticipated problems during game play. However, a further experiment is planned with the online African Farmer game, which will use two versions of the game that differ only in the social model.

The different number of annual cycles completed within the playing time hints at the differences between the two games. Africulture contains a much more complex set of decisions than GRG, and this resulted in each annual cycle taking longer. For this experiment a decision was made to keep the playing time between the two games constant, rather than the number of cycles. This resulted in the players having the same amount of game play, and hence contact with their team members, but it may have been more difficult for the players of Africulture to gauge the relative success of their team as compared to GRG.. This in

turn may have had an effect on the results, given that group success is shown to have an impact on team cohesion [4]. Again, in the follow-up experiment with African Farmer, we plan to keep the time taken for each annual cycle similar between the two versions.

Some of the differences in social model are quite difficult to bring out in the course of the game-play. For example, the ability to change teams was not spelt out by the Africulture game manager. It was clear from the discussion at the end of the game that players had assumed they were able to move teams (one player mentioned selling her “wife” to another household!). GRG does not allow players to change teams, but again this was not explicitly stated. Unlike the Africulture players, none of the GRG players expressed any interest in changing teams. This is not dissimilar to the way a number of online game rules are discovered by players, through hints gleaned during play e.g. from the aesthetics rather than the manual [12]. It may well be that making this difference explicit at the start of the game would actually have increased the difference seen between the two games, however it is not always practical to discuss all of the rules at the start of the game.

These initial findings suggest a relationship that could be further explored in future research by examining the different factors individually, although some factors will be more difficult to isolate than others when creating a coherent and enjoyable game. From a game design perspective, this research suggests that game designers may be able to make conscious choices in terms of their game rules which will have a positive impact on team cohesion during the game.

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